



## Tongue lacerations in children: to suture or not?

Seiler, Michelle ; Massaro, Sandra Letizia ; Staubli, Georg ; Schiestl, Clemens

**Abstract:** AIMS OF THE STUDY Tongue lacerations are common in children, occurring mostly from falls or sports injuries. Optimal treatment of tongue lacerations is a challenge for paediatricians due to contradictory recommendations and a lack of current guidelines. It remains unclear which tongue lacerations should be sutured and which would benefit from spontaneous healing, which is a promising alternative. In recent years, the treatment of choice in our paediatric emergency department (ED) has shifted from generally suturing the wounds to more frequently advising secondary wound healing. The aim of this study was to analyse tongue lacerations treated at our ED in order to develop guidance for the optimal management of tongue lacerations in children. **METHODS** This retrospective study was conducted to assess tongue lacerations at the ED of a University Children's Hospital Zurich from January 2010 to August 2015. All families were contacted for informed consent and photo documentation of the healed tongue. Clinical records of all the patients included were reviewed and different variables were defined and analysed. **RESULTS** A total of 73 children with tongue lacerations were included (75.3% boys, mean age  $\pm$  standard deviation  $4.0 \pm 2.6$  years). The mean size of the lacerations was  $12.4 \pm 8.3$  mm, with affected tongue borders in 51 cases (69.9%) and a through-and-through laceration in 23 patients (31.5%). A primary wound closure was performed in 12 children (16.4%). These wounds were significantly larger than those of the secondary wound healing group ( $21 \pm 10$  mm compared to  $10.8 \pm 6.8$  mm), presented gaping wound edges with the tongue at rest more frequently (91.7% compared to 32.8%), and showed through-and-through lacerations more often (91.7% compared to 19.7%). The group with wound suturing needed longer to recover (median 13 days compared to 6.2 days) and had a higher rate of complications (25 vs 3.3%). **CONCLUSIONS** Suturing is not required in gaping tongue lacerations less than 2 cm long that do not involve the tip of the tongue. The Zurich Tongue Scheme was developed as a guide for clinicians when deciding which tongue lacerations need suturing.

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## Tongue lacerations in children: to suture or not?

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### Summary

**AIMS OF THE STUDY:** Tongue lacerations are common in children, occurring mostly from falls or sports injuries. Optimal treatment of tongue lacerations is a challenge for paediatricians due to contradictory recommendations and a lack of current guidelines. It remains unclear which tongue lacerations should be sutured and which would benefit from spontaneous healing, which is a promising alternative. In recent years, the treatment of choice in our paediatric emergency department (ED) has shifted from generally suturing the wounds to more frequently advising secondary wound healing. The aim of this study was to analyse tongue lacerations treated at our ED in order to develop guidance for the optimal management of tongue lacerations in children.

**METHODS:** This retrospective study was conducted to assess tongue lacerations at the ED of a University Children's Hospital Zurich from January 2010 to August 2015. All families were contacted for informed consent and photo documentation of the healed tongue. Clinical records of all the patients included were reviewed and different variables were defined and analysed.

**RESULTS:** A total of 73 children with tongue lacerations were included (75.3% boys, mean age  $\pm$  standard deviation  $4.0 \pm 2.6$  years). The mean size of the lacerations was  $12.4 \pm 8.3$  mm, with affected tongue borders in 51 cases (69.9%) and a through-and-through laceration in 23 patients (31.5%). A primary wound closure was performed in 12 children (16.4%). These wounds were significantly larger than those of the secondary wound healing group ( $21 \pm 10$  mm compared to  $10.8 \pm 6.8$  mm), presented gaping wound edges with the tongue at rest more frequently (91.7% compared to 32.8%), and showed through-and-through lacerations more often (91.7% compared to 19.7%). The group with wound suturing needed longer to recover (median 13 days compared to 6.2 days) and had a higher rate of complications (25 vs 3.3%).

**CONCLUSIONS:** Suturing is not required in gaping tongue lacerations less than 2 cm long that do not involve the tip of the tongue. The Zurich Tongue Scheme was developed as a guide for clinicians when deciding which tongue lacerations need suturing.

**Keywords:** tongue laceration, secondary wound healing, paediatric emergency department, Zurich Tongue Scheme

### Introduction

Tongue lacerations, usually from falls or sports injuries, are common in children and involve mostly the anterior dorsum of the tongue, followed by the mid-dorsum and anterior ventrum [1–3]. Tongue lacerations may lead to haemorrhage, tongue dysfunction, disfigurement and possible airway obstruction [3, 4].

Choosing an optimal treatment for tongue lacerations remains a challenge due to contradictory recommendations and a lack of current guidelines. Over 40 years ago, English et al. proposed that small lacerations do not need to be sutured when margins are at a good approximation [5]. In the 1990s, several other propositions were made: suturing both dorsum and lateral border injuries [6], loosely suturing tongue wounds and placing deep wounds in layers [7], and suturing only wounds larger than 2 cm or when haemorrhaging is a concern [8]. However, suturing may predispose the tongue to invasive closed space infection [7]. These contradictory guidelines are also confusing for general practitioners and paediatricians, who must often decide which children need to be transferred to a paediatric emergency department (ED) for treatment.

The purpose of a primary wound closure is to approximate the wound edges in order to facilitate the healing process for normal function with minimal risk of infection and give a satisfactory cosmetic result. Most patients are young children and therefore suturing mostly requires general anaesthesia with possible complications. An alternative treatment is to leave the laceration alone to heal secondarily. This is an option because the tongue has a rich vascular supply with an effective regeneration capacity and thus a marked tendency for self-healing [8–10].

The emergency department (ED) of the University Children's Hospital Zurich treats approximately 30 children with tongue lacerations annually. In recent years, the treatment of choice has shifted from generally suturing the wounds to advising secondary wound healing, mostly with the belief that the outcome is approximately the same. Nevertheless, it is still necessary to define which tongue lacerations benefit from suturing.

The aim of this study is to analyse the tongue lacerations treated at the ED of University Children's Hospital Zurich in order to develop guidance for the optimal management of tongue lacerations in children.

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## Materials and methods

### Subjects

Patients aged 0 to 16 years who had been diagnosed with a tongue laceration at the ED of the University Children's Hospital Zurich between 1 January 2010 and 31 August 2015 were included in this retrospective, single-centre cohort study. Exclusion criteria were no informed consent and known coagulation or wound-healing disorders. The local ethics board approved this study.

Clinical records of all the patients included were reviewed and the following data were collected:

- Demographics: age (rounded to the nearest half year) and gender
- Wound characteristics: gaping wound edges, approximate size, location, through-and-through laceration
- Time elapsed between accident and ED presentation
- Wound treatment
- Outcome
- (Approximate) duration of complaints
- Time elapsed between ED visit and telephone interview: less than 6 months, 6 to 12 months, more than 1 year

Two procedures were followed. First, whether wound edges were gaping was assessed with the tongue in rest position and not upon protrusion of the tongue, a standardised examination technique at our ED (fig. 1). Second, to complete the data, all families were contacted for informed consent, photo documentation of the healed tongue and a telephone interview. If we did not have photo documentation, we accepted an estimation or description of the wound.

### Wound treatment

Regardless of the method chosen for wound closure, all patients were examined for concomitant injuries, and wounds were carefully inspected for possible foreign bodies, especially teeth fragments. Tongue lacerations were always su-

tured by an emergency physician with Vicryl® 3-0 or 4-0 (coated polyglactin 910, Ethicon), as well as with single and recessed button sutures. Antibiotics were never prescribed; the only analgesic treatment was with paracetamol or non-steroidal antiphlogistic medication.

### Statistics

Categorical data were described as frequencies, while continuous variables were described as means with standard deviation (SD) or medians, as appropriate. Statistical analyses were performed with the IBM® SPSS® statistics version 24.

## Results

### Patient population

A total of 133 children with tongue lacerations were treated during the study period. Sixty (45.1%) patients had to be excluded because there was no informed consent (although families had been contacted up to three times). Overall, 73 (54.9%) cases could be analysed, of which 55 (75.3%) involved boys. The mean age was  $4 \pm 2.6$  years (range: 6 months to 13.5 years).

The time elapsed between the accident and presentation at the ED was  $2.6 \pm 6.1$  hours.

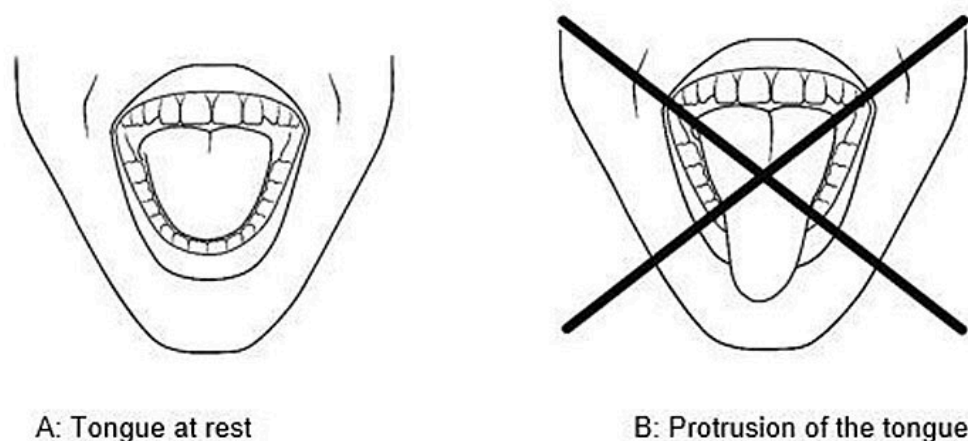
### Wound characteristics and treatment

Table 1 illustrates that tongue lacerations on which a primary wound suture was performed were larger than those in the spontaneous healing group, and presented gaping wound edges and involvement of the tongue borders more often. None of our tongue lacerations were complex injuries with active haemorrhage or bisecting wounds.

A remaining scar existed in 28 (38.4%) treated patients, of which seven were primary sutured due to gaping wounds, six had a through-and-through laceration and five had affected tongue borders.

The median duration of complaints was 13 days in the sutured group and 6.2 days in the spontaneous healing group.

Figure 1: Assessment of tongue lacerations.



In 81% of cases, the time interval between the ED visit and the standardized telephone interview was twelve months or longer.

Examples of tongue lacerations at the time of the accident and after healing can be seen in [figure 2](#).

## Discussion

The optimal treatment of a child presenting with a tongue laceration is a challenge for the treating medical team, with the question of whether to suture or not. The results of our study indicate that most tongue lacerations probably do not require suturing due to the tongue's marked regeneration capacity.

Most patients in our study were young children with a mean age of 4 years, a majority of whom were boys. This result is in line with previous research that has demonstrated that there are more male patients in this age group [11]. Many parents came directly to the ED within 3 hours of the injury, other parents were referred to our ED for tongue

laceration treatment by general practitioners or paediatricians in light of their previous experience.

Tongue lacerations were mostly located at the anterior dorsum of the tongue and the mean size was approximately 12 mm. Although the tongue borders were involved in 51 cases (69.9%), suturing was only performed in 11 of them (21.6%). Thus, it is likely that the decisive factors determining whether a primary wound closure was performed were the length of the tongue laceration and whether the wound edges were gaping when the tongue was at rest rather than the involvement of the tongue border. Furthermore, we recommend that a tongue laceration be assessed with the tongue at rest because this position is the most frequent position. If wound edges are not gaping in this position, then the chances of a satisfactory secondary wound healing are high.

Not suturing, a conservative wound management of tongue lacerations, seems to pose fewer disadvantages, is less traumatic for the child and parents, and entails less time and fewer costs than suturing. An alternative treatment



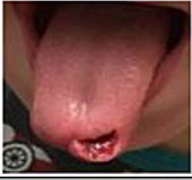
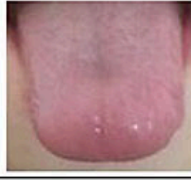
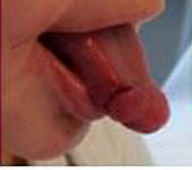

**Table 1:** Age, wound characteristics, and outcome in the two intervention groups.

	Primary wound suture (n = 12)	Secondary wound healing (n = 61)	Total (n = 73)	p-value
Age in years, mean ± SD	4.5 ± 3.3	3.9 ± 2.5	4.0 ± 2.6	0.488
Length of tongue laceration in mm, mean ± SD	21.0 ± 10.0	10.8 ± 6.8	12.5 ± 8.3	0.000
Gaping wound edges, n (%)	11 (91.7%)	20 (32.8%)	31 (42.5%)	0.000
Tongue border involvement, n (%)	11 (91.7%)	40 (65.6%)	51 (69.9%)	0.114
Tip of the tongue, n	6	16	22	
Lateral tongue, n	5	24	29	
Through-and-through, n (%)	11 (91.7%)	12 (19.7%)	23 (31.5%)	0.000
Complications, n (%)	3 (25%)	2 (3.3%)	5 (6.8%)	0.029
Duration of complaints in days, mean ± SD	32.4 ± 49.2	11.2 ± 23.8	14.7 ± 30.1	0.025


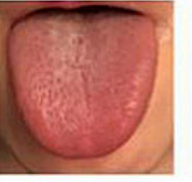



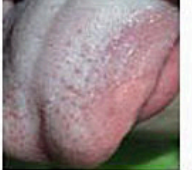
SD = standard deviation

**Figure 2:** Tongue lacerations before and after treatment.

### A: Patients with primary wound suture

Wound characteristics	Outcome
	
	
	

### B: Patients with spontaneous wound healing

Wound characteristics	Outcome
	
	
	



with tissue adhesive was suggested by Rudresh et al. [12] and Flinzberg et al. [13] in individual cases; however, it remains unclear whether no intervention might have resulted in the same outcome.

The decision to suture a tongue laceration in a child needs to be assessed carefully. Normally, the surgical procedure must be performed under general anaesthesia, which incurs potential risks. Furthermore, children occasionally lose their sutures shortly after the operation because they chew on the stitches [3]. This is why we recommend a suture technique with single and recessed button sutures and with absorbable thread of sufficient thickness (e.g., Vicryl® 3-0/4-0). Moreover, suturing does not in general improve functional and cosmetic outcomes [12]. Complex tongue lacerations which require repair are bisecting wounds, large flaps, and wounds with active haemorrhage [14].

The tongue lacerations we analysed resulted in desirable outcomes with normal functioning after healing, with only a small number of complications (6.8% of cases). For example, granuloma may develop after wound suturing with non-absorbable material due to a foreign-body reaction [15]. Impairments to wound healing due to granuloma formation were noted in 5.5% of children. This resolved itself spontaneously in 75% (3 of the 4 children) of cases. Lysing occurred in one child (1.4%) after wound suturing. No wound infection occurred, which indicates both that secondary wound closure does not increase the risk of infection and that there is no need for antibiotic prophylaxis.

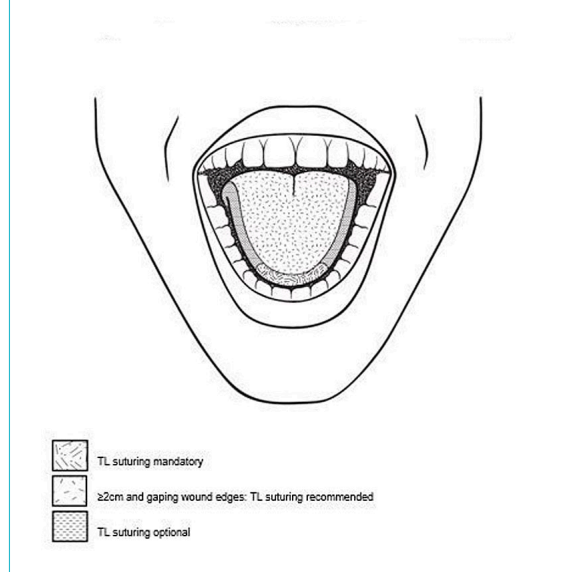
A scar was noticed in 38.4% of patients. In the conservative management group (no sutures), the rate was 34.4% (21/61 patients), whereas in the surgical management group (sutures) it was 58.3% (7/12 patients). The injuries in the primary wound closure group were probably more severe than in the secondary wound closure group, which might explain the higher rate of scarring. The duration of complaints also lasted twice as long in the primary wound closure group (2 weeks) than the secondary wound closure group (1 week).

The Zurich Tongue Scheme (ZTS) is a method, based on the data from our study, to identify which tongue lacerations in children benefit from suturing (fig. 3). As well as complex tongue lacerations with functional loss of the tongue (bisecting wounds and large flaps) and persistent active haemorrhage, the following tongue injuries with gaping wound edges in a rest position seem to benefit from a primary wound closure: tongue lacerations affecting the tip of the tongue and those with a length of more than 2 cm on the dorsum of the tongue. Not suturing these lacerations could result in either an unsatisfactory cosmetic outcome on the tip of the tongue or delayed wound healing. The ZTS is also intended as a guide to the correct selection of patients who need to be transferred to an ED for suturing. It should thus assist all caregivers and paediatricians as they make decisions on whether to suture or not. Nevertheless, regardless of the choice of wound management, clinicians need to assess the wound carefully so as not to overlook foreign bodies and to rule out the involvement of teeth injuries.

### Limitations

This was a retrospective study and therefore entails a number of limitations. First, these results cannot be generalised

**Figure 3:** Zurich Tongue Scheme for non-complex tongue lacerations in children.



because it was monocentric. Second, no randomisation was performed because each treating ED physician chose the treatment regime. Third, the documentation concerning wound size and the duration of complaints was sometimes imprecise because it was estimated by the parents. Additionally, the standard deviations regarding the length of tongue lacerations, especially in the secondary wound healing group, were large, probably due to clinicians missing guidelines and accepting larger wounds for spontaneous healing over the years. Fourth, the retrospective methodology meant that no wound controls were assessed in a standard way. We therefore recommend that a prospective, randomised trial be conducted to assess the ZTS.

### Conclusion

Tongue lacerations typically occur in young children and therefore careful assessment is needed to determine whether a primary wound closure under general anaesthesia, with its possible related complications, is required. We recommend the ZTS as a guide for caregivers/physicians when they make their decisions; we also recommend conservative wound management, even in lacerations with gaping wound edges, for all tongue lacerations smaller than 2 cm, except if the tip of the tongue is affected.

### Disclosure statement

No financial support and no other potential conflict of interest relevant to this article was reported.

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